Statement of
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House Homeland Security Subcommittee on Economic Security, Infrastructure Protection and Cybersecurity

LEVERAGING TECHNOLOGY TO IMPROVE AVIATION SECURITY
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Thank you Chairman Lungren, Congresswoman Sanchez and Members of the Committee for this opportunity to discuss the benefits of leveraging technology to improve security at our nation's airports. Securing our commercial aviation system remains a high national priority. We have experienced first-hand the devastating effects that inadequate security can bring. We recognize that increasing the effectiveness of security operations must be done in a cost-effective manner given the limited resources available – and GE is willing to work with the US government to increase security through effective and cost-saving technology.

As reported on July 4, 2005 in the Washington Post, Dulles International Airport is experiencing increasing delays due to the baggage screening operation. This problem will escalate not only at Dulles but nationwide as traffic levels continue to rise. We believe that the solution is automating screening with In-line systems. I will discuss the economic justification for and benefits of In-line EDS screening; the need for adequate funding; future technology developments for aviation and transportation security and thoughts on how to accelerate achieving our goal of protecting the flying public and the aviation industry.

Although much money has been spent on aviation security since the tragic events of 9/11, the job is not completed. The 9/11 Report by the National Commission on Terrorist Attacks Upon the United States recommended:
"The TSA should expedite the installation of advanced (in-line) baggage screening equipment". There seems to be general agreement that this must be done, but little consensus on how to accomplish this task.

Background
InVision Technologies, Inc. developed the first technology to be certified as an EDS in 1994. GE acquired InVision in 2004 as a major part of GE's commitment to becoming a leading provider of security solutions. In the eleven years following this major achievement, a family of GE Security explosive detection products has been developed to meet the variety of needs at different size airports. This includes five, certified checked baggage EDS products.

In addition to checked baggage EDS, GE trace detection portals and electronic trace detection (ETD) systems are deployed at airports and other facilities to detect explosives on people, their belongings and cargo. GE also provides cargo container security systems, biological detection, nuclear and radiological detection, access control, integration of security systems and other security products and services to the public and the private sectors worldwide.

Continuing its history of innovation and as another first, GE received EDS certification for a diffraction based x-ray system last year. Ten years from the first EDS certification, a powerful, new technology has been added to the war on terrorism by combining CT with diffraction x-ray screening in a system-of-systems designed to optimize automation, efficiency and security.

Substantial improvements to EDS technology have been made over the years. Lower false alarm rates, higher throughputs and increased reliability have been achieved on a continuing basis. Features such as Multiplexing (MUX) and Remote Image Replay (RIR), that were made possible by networking the equipment, have provided impressive progress in process efficiency and cost savings. The San Francisco and Jacksonville airports have MUX and RIR and have seen staffing requirements decrease by as much as 70%.

The Business Case for In-line EDS

In March of this year the Government Accountability Office (GAO) produced a report on In-line EDS at airports entitled "Systematic Planning Needed to Optimize the Deployment of Checked Baggage Screening Systems". GAO concluded that use of EDS systems was the most cost effective method of screening checked baggage at many of our nations' airports.

Only nine airports have received full (75%) Letter-of-Intent (LOI) funding for their In-line projects to date. All but one of these airports is a Large Hub facility requiring major construction to institute a screening system. Despite the substantial investment, GAO reports that TSA estimated that "in-line baggage screening at (the nine airports receiving LOIs) would save the federal government $1.3 billion over 7 years compared with stand-alone EDS systems TSA would recover the initial investment in a little over 1 year". Given that many airports without In-line systems employ an even more labor-intensive and costly screening process using trace detection, the savings potential for the Large and Medium Hub airport system is likely to be even greater.

Working closely with airports that have In-line EDS baggage screening with CTX equipment, GE has analyzed the cost savings and other benefits of such systems. As expected, these are substantial and produce models worth deploying at other airports. Not all airports are viable candidates for the most complex In-line EDS systems, that centralize screening to handle large throughput requirements; however, it does make sense for many airports and for the federal government. As GAO noted, even at an average cost of approximately $2.5 million in infrastructure cost per EDS, the payback is rapid.

Our modeling for Large Hub airport baggage screening operations, defined as an average 5000 bag per hour peak, shows that a $57 Million dollar capital investment will result in a $20 Million dollars per year savings in operational expense. This analysis compares In-line EDS to a standalone type EDS screening operation currently conducted in ticketing lobbies. The savings are primarily in labor related costs. If one were to compare In-line EDS to using trace detection for primary screening of checked baggage in this model, the operational cost savings becomes an astronomical $70 Million dollars per year at a Large Hub size airport. Although trace detection as the primary checked baggage screening method at this size airport is not the preferred option, the Transportation Security Administration (TSA) frequently relies on trace detection to varying degrees due to the inefficiencies inherent in lobby area EDS screening and the lack of available EDS equipment.

Each airport is unique; therefore, modeling alone does not allow us to confidently extrapolate system costs.It is better to use actual airport cost estimates to obtain a valid projection of capital requirements. Since every airport will not be a candidate for In-line baggage screening systems, it is also more appropriate to limit discussions to those that are. Based on survey data gathered by the airport associations, it is estimated that the first sixty-four airports identified as benefiting from such an In-line system, would require $4 Billion in infrastructure capital from the federal government. Adding in new equipment costs, we estimate a total need of nearly $5 Billion. Although the larger airports require a larger investment, the operational savings are also greater, resulting in an estimated <u>annual</u> operational savings of $1 Billion dollars.

San Francisco's latest In-line project provides a real life example. The airport spent $16 Million in infrastructure costs to install 11 CTX 9000 EDS machines in Terminal T-3. This Terminal houses United Airlines domestic operation, handling over a third of the airport's total checked baggage. This investment resulted in a reduction of over 70 TSA FTEs required to handle checked bag screening. The airport's average infrastructure cost per EDS machine is $1.7 Million.

Small Airport Solutions

Simpler and less expensive Mini In-line systems are a proven checked baggage screening option for smaller airports and airport operations with lower throughput requirements. These options can cost from as little $100,000 to $1.5 Million per machine in associated infrastructure costs.

Blue Grass International Airport in Lexington, KY, Traverse City, MI and Ft. Walton Beach, FL screen all their checked bags with two CTX5500 EDS machines. Blue Grass estimates that its system saves $3.1 Million per year in operating expenses for the TSA, with return on its investment in just 16 months. Payback on the infrastructure investment required providing in-line systems to Small Hub size airports drops to less than one year if existing EDS are reused.

Capital investment is minimized through reuse of EDS equipment. The federal government owns over 500 CTX2500 and 5500 EDS machines, many of which can be relocated and reused for In-line projects at smaller airports. As currently funded projects at airports such as Dallas-Ft Worth and Denver come online, these valuable EDS assets will become immediately available for use at other facilities. There are enough machines in existing inventory today to cover all the Small Hub airports without investing any additional dollars for equipment. There would even be machines left over for screening break cargo, mail or other screening applications at any high-risk site.

Leigh Fisher, a well-established aviation industry consultant, has independently analyzed the checked baggage screening options. They reported their findings at an aviation industry conference in 2004. , They found for the mid-range of airports the most cost effective solution is a small EDS In-line system. Their analysis shows that In-line EDS is appropriate even for airports originally considered too small to warrant such systems.

This type of low cost In-Line installation option has existed for over a decade. The first In-line EDS was installed in United Airlines International check-in counter in San Francisco in 1995. Dozens of such installations were in place prior to the 9-11 tragedy. Systems placed directly in bag conveyor lines were installed for as little as $110,000 per machine. Since these projects often involved one EDS per airline or airport, a project that covered an entire airport operation today would have an even lower cost per machine. This is because general costs such as design and permitting would be spread over more machines. These lower throughput solutions are every bit as viable today for small airport and low throughput requirement operations in large airports.

Safety Benefits
An additional consideration and benefit of In-line EDS screening is the reduction of on-the-job injuries. TSA is experiencing the highest level of workman's compensation claims in the federal government. Automating bag handling with In-line EDS systems will dramatically decreased this problem. The TSA reports that claims were down 42% and total cost of workmen's compensation is down 77% with implementation of its In-line system in San Francisco.

Additional Security Considerations
Crowded ticketing lobbies are an attractive and vulnerable target for terrorists and other criminals. Moving baggage screening away from this area is prudent in order to mitigate this risk. In-line baggage screening also minimizes the potential for serious operational impacts. Evacuating a ticketing area to resolve an unknown threat wreaks havoc on timely ticketing, boarding and aircraft departure. Even an hour delay at one airport can cost millions of dollars and produce a ripple effect in operational impact through the aviation system.

Screening baggage in non-public, controlled access areas is also inherently more secure than in public lobbies. There is far better ability to prevent tampering with bags after they have been screened. The chain of custody of the bag is unbroken and all personnel handling the bag have undergone background checks in order to be given access to the secured areas of the airport.

Cargo and Mail

Equipment installed to handle checked baggage can and does serve multiple purposes. The machines can be used to screen counter-to-counter packages, break bulk cargo and mail that is carried aboard commercial aircraft.

Creative Financing

Public support wanes as time passes following a major security event. When this happens, competing needs often jeopardize security funding. Relying on the annual appropriations process for the federal government to fund In-line EDS projects is problematic for airports and their communities. Delays and funding uncertainty result in excessive construction and redesign costs, as well as added complexity in executing capital improvement programs. Taxpayer monies are spent on inefficient and labor-intensive processes that do not provide the same level of security that can be achieved using the same funds more effectively.

Congress and the industry, led by AAAE and ACI-NA, recognized the challenge of financing the capital expenditures required to install explosive detection systems in U.S. airports. The Letter of Intent Program (LOI) was an excellent first step in ensuring that airports would receive the necessary capital funds. This Program did not address, however, the fact that substantial funds would be needed in a relatively short timeframe. This has resulted in a funding shortfall. Only eight LOIs have been issued to date, covering only nine of the 429 certified airports. TSA has not issued a new LOI since FY04 and has no funding for additional LOIs in the proposed FY06 Budget.

Other government capital programs, and almost all major investments by private industry, utilize longer term financing options to meet their needs. It is unusual and unnecessary to require up front funding from DHS annual appropriations of both EDS equipment procurement and EDS installation by airports (with LOI reimbursement). Multi-year leases with annual renewals and managed service agreements are but two of the financing tools used by other government agencies to fund their major capital projects. Such financing options must be explored as a method of solving these funding problems.

Two examples of using long-term financing demonstrate the type of savings possible. Assumptions used:

1. Private sector capital utilized
2. Government repayment using annually appropriated funds
3. A 7-year financing term
4. A 10-year useful life for EDS equipment

Applying a financing plan as described above to our Large Hub airport model, we can cover debt on the $57 Million dollars over 7 years with an approximate annual repayment obligation of $10 Million. The corresponding annual operational savings realized in the first year and each year of the 7-year financing term is $20 Million dollars. The resulting $10 Million per year in net savings begins in Year 1 and continues for the 7-year term of the financing. After completion of the 7-year financing term, the annual net savings would be $20 Million for the balance of the useful life of the assets. Total savings over a 10-year period to the federal government for financing an In-line EDS system versus retaining its standalone EDS lobby screening operation is $130 Million dollars.

If we look at the project in total, it is estimated that a capital investment of $5 Billion dollars is needed to fund both infrastructure and equipment to fully implement the In-line EDS solution. Full deployment of In-line EDS can result in annual operational savings of $1 Billion per year. For analysis purposes, if we were able to have a common financing start date for all airports requiring In-line EDS, the operational savings applied to repayment coupled with $500 Million per year authorized by Congress for construction of In-line EDS would result in a payback period of less than 4 years, at which point the annual saving to the Government would be $1 Billion dollars net per year.

Bag Delivery Services

A promising potential for baggage screening involves the ingenuity of private entities. The business of baggage delivery for a fee is a growing enterprise. The public may well be willing to pay for the convenience of having their bags picked up in advance of a trip and transported by a private service to their destination. This business model may provide some answers to screening of bags and cargo. If the public pays for this service, the cost of security screening can be included in the fee. A centralized screening facility on-airport can also be used to screen cargo and as an overflow facility for airline baggage.

The Future

Although great strides were made over the last decade in EDS performance, we anticipate that improvements and breakthroughs will escalate based on the existence of a real market need for better solutions. With GE's entry into the aviation security arena, a substantial increase in resources, including technological expertise, has become available to apply to R&D efforts to advance the state of the art.

GE is already leveraging its industry-leading position in imaging and other technologies to develop tomorrow's solutions. Carry-on baggage screening, passenger portals combining multiple screening technologies, container security devices with multiple threat detection capability and standoff detection are only a few of the innovations in the works.

To realize the benefits of such innovations and to spur research in advanced security technology solutions, there must be a plan and a path from research to development to deployment. Technologies developed for aviation are not only portable to other transportation industries, but can be used to mitigate threats in other areas such as our borders, ports, government buildings, nuclear facilities, chemical plants, and iconic structures. A timely example is millimeter wave combined with smart video used in standoff detection applications. This technology could be deployed unobtrusively in public areas such as metro and rail stations to detect explosives without requiring aviation security style portals.

As the aviation industry continues its trend toward technology-driven automation critical to cutting expenses and improving efficiency, TSA must do the same. The airlines and airports are moving rapidly towards automating all of passenger processing, from printing boarding passes on home computers to common-use, self-serve kiosks. Processes that are expensive, labor-intensive or even simply frustrating for the customer cannot be supported in such an economically sensitive industry.

The future of checked bag screening, as well as screening of passengers, carry-on bags and cargo, must rely on automation. Not only does automation save life-cycle screening costs, it greatly improves the ultimate security of the system by minimizing the unknowns associated with the human factor.

Reducing the human factor in the screening process will also minimize bag openings. One of the most attractive benefits of EDS is its ability to perform non-intrusive detection. The need to open bags for threat resolution, along with the associated opportunities for misplaced bag contents, can be almost eliminated by coupling CT and diffraction-based EDS technologies. Yxlon EDS diffraction x-ray is designed to resolve bags that alarmed on the CTX EDS and cannot be cleared by On Screen Resolution. We estimate the payback on implementing Yxlon EDS equipment at approximately two years.

Another example of leveraging technology is implementing something as inexpensive and simple to install as Remote Image Replay for automatic electronic images of and data on alarms to be used in threat resolution. GE calls this feature ViewLink for CTX5500 and 2500 products and Passive Threat Resolution Information (PTRI) as part of a Multiplexed CTX9000 networked system. This screening automation feature saves San Francisco Airport's security operation over $3.5 Million dollars a year in labor and consumables.

Increased research with rapid testing and deployment of successful technology can provide continuous improvements to efficiencies and economics of security. Automation is the key to optimizing these systems. This is the direction in which we must continue.

Summary

In-line EDS makes sense from a security, economic and operational perspective. We must continue to increase the efficiency of the system through technological advancements and flexible system designs that meet the needs of all stakeholders. We must also explore financing options to accelerate the availability of funding for this much-needed investment in the safety and security of our nation's aviation system and the flying public.

Yxlon 3500 Level 3 Alarm Resolution Cost Effectiveness Model

Prepared by Y. Margalit and A. Neeman, GE Infrastructure, Security

Based on SFO International Terminal Data

Input Assumptions		Comments
Level 1 EDS False Alarm Rate	21.0%	With inspection improvements, US national average
Level 1 EDS FAR (co-tuned, used only with XRD)	23.5%	Detection tuned up for XRD-CTX combined certificatio
Level 2 operator alarm resolution (non-resolved bag ratio)	50%	Input from SFO
Cost per MUX and ETD operator, per year	$ 50,000	Operator fully loaded cost
Number of shifts per day per station	3.0	Input from SFO, weighted by average staffing
Airport / terminal peak load, bph	3,600	Input from SFO Int'l Terminal (12 CTX 9000's)
Average operator OSR time, seconds	18	Input from SFO
ETD operator throughput (PTRI directed trace), bph	10.9	Based on 5.5 minute average US nationwide
Capital Cost of ETD	$ 50,000	Lifespan of 4 years
Ratio of operators per ETD machine	2	
Annual maintenance of ETD machine	$ 4,000	Annual Maintenance Cost @ 8%
SoS alarm rate	6.0%	Cert test
Yxlon 3500 throughput	200	Demonstrated in AENA (Spain) test and Phoenix work
Yxlon 3500 throughput in fullbag mode	60	
Capital Cost of XRD, Yxlon 3500	$1,300,000.00	Sales price with Yxlon installation
Infrastructure modifications cost of XRD (Yxlon 3500)	$1,300,000.00	Equal to 100% Capital Cost
Maintenance cost of XRD at 9% of Capital Cost	$ 117,000.00	9% of Capital Cost
Rate of CTX to XRD alarm miss registration	1%	

Current MUX / ETD at BIR Expense Calculations		
Number of EDS operators needed	4	Bags that alarmed at CTX X average OSR throughput
Total cost of CTX Level 2 operators	$ 567,000	Number of operators X shifts X cost of operator
Alarm bag rate to ETD at BIR (NARP resolution rate)	11%	Peak load X unresolved from MUX NARP
Alarm bags to ETD (Level 3)	378	Peak load X FA rate X unresolved from MUX NARP
Number of ETD operators at peak load at BIR	35	Bags sent to BIR X ETD operator throughput
Number of ETD operators	104	Operator stations X shifts
Labor costs of ETD	$ 5,201,835	ETD operators X operator cost
Number of ETD machines	17	
Total capital cost of ETD	866,972	
Total maintenance costs of ETD machines	$ 69,358	Number of machines times annual maintenance cost
Total Annual Cost of MUX and BIR Operations	**$ 5,838,193**	

Forecasted OSR, XRD and ETD at BIR Expense Calculations (using OSR at level 2 TRIs)		
Throughput of XRD combining all inspection modes	151	
Number of EDS operators needed	4.23	Bags that alarmed at CTX X average OSR throughput
Total cost of CTX Level 2 operators	$ 635,040.00	Number of operators X shifts X cost of operator
Peak number of alarm bags to XRD	423	All OSR alarms go to XRD
Alarm bag rate to ETD (system-of-system FA rate)	3.0%	Simple multiplication of EDS, OSR and XRD FA rates
Number of Yxlon 3500 needed	3	Rounded up to integer
Peak number of alarm bags from XRD to ETD	108	Airport peak load X system FA rate
Number of ETD operator stations	10	
Number of ETD operators	30	Operators X number of shifts
Labor costs of ETD	$ 1,486,239	ETD operators X operator cost
Number of ETD machines	5	
Total capital cost of ETD	$ 247,706.42	Number of machines X capital cost
Maintenance of ETD machines	$ 19,817	Number of machines times annual maintenance cost
Maintenance of XRD machines	$ 351,000	Number of machines times annual maintenance cost
Total Aunnual Cost of OSR, XRD and BIR Operations	**$ 2,492,095**	

Cost Effectiveness Analysis		
Total annual Operating Cost savings	**$ 3,346,098**	
Net ETD capital expediture savings	**$ 619,266**	Assumes purchase or 1 replacement cycle of ETD
XRD capital expenditure	**$ 7,800,000**	
ROI (months)	**25.8**	

Cost-Benefit Analysis (MUX at SFO)

# of CTX 9000	46	
bpm (Bags per Minute) Airport wide	100	
Averege Screener view time (seconds)	20	
Alarm Rate (Avg. of Domestic and Int'l bags)	22%	
Number of Screeners Required without MUX	46	One screener required per CTX 9000
Number of Screeners Required with MUX	8	Equal to bpm x Alarm Rate x Avg View Time
Number of Screeners Required (with MUX) With supervisor and lunch and break relief	12	
Manpower Savings from MUX (per shift)	34	
Manpower Savings from MUX (hired to staff)	102	This takes the Daily staff savings x 1.4 to cover 7 day/wk operation and vacation and sick days
TSA manpower cost for On-screen resolution screeners	$60,000	
Yearly Manpower Savings	**$6,120,000**	

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